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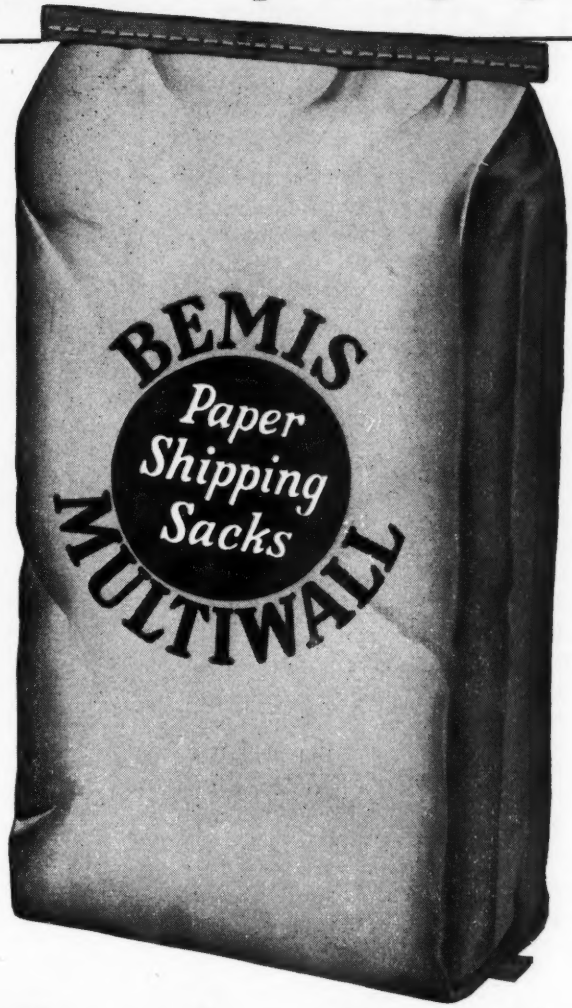

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AGRONOMY AND ECONOMY

From a Commercial Point of View

By
Arthur M. Smith
Mathieson Chemical Corporation,
Baltimore, Maryland

• • •

THE disturbed political and economic situation in the world is such that our country, and each producing individual, is faced with a serious economic burden. To maintain crop production at profitable levels without bankrupting our soils, and without deficit financing in terms of lost fertility, will require in most states a more general and more immediate application of the information gained through research in plant and animal (including human) nutrition.

Game of Life

In the grimly realistic game of life as it is played in the big league of big nations, every member of our team, agriculture, industry (including labor), the professions, education and government must coordinate every effort to avoid dropping the ball to the opposition. The haste and the waste of the war programs may be over, but the seriousness of the situation demands a thorough analysis of every crop production practice, to the end that programs and procedures for the most efficient production possible be outlined and made effective.

In agriculture this means the educational job of taking Soil Conservation from the pilot plant stage to that of universal application; it means also the application of the improved practices in plant and animal production which research continuously makes available; and it means production for end uses that build up rather than burden the national economy.

In the production and use of fertilizers it means (in so far as may be practical) the elimination of back hauls on raw materials; vertical integration in the assembling and combining of primary plant foods; the practical elimination of luxury consumptions and of the application of elements and compounds that are not required for any given cropping system and soil.

Coordination

With reference to agriculture, and that part of industry engaged in the manufacture and distribution of fertilizers, the close coordination of effort required by the seriousness of our national situation can be achieved only by an increasingly better understanding and exchange of thought individually and collectively between those engaged in agricultural research and education, and those engaged in the fertilizer industry.

Meetings and short courses for the instruction of fertilizer dealers and salesmen are fine, and a step in the right direction. There is also a need for more frequent contact and exchange of information at the higher technical levels in which the interpretation of results could be considered in relation to practical programs for their application. And, it seems to me, there is a further and even more important opportunity and need, namely, for conferences at the top executive level in which the Directors and responsible Department Heads in each state would present the overall nutrition and fertility requirements to those who control the manufacturing policies and programs of the factories interested in supplying agriculture in that state. Telling the individual farmer what he needs and should use is important.

Dealer Informed

Getting the individual dealer and salesman oriented and informed is important. Exchanging technical information with the commercial agronomists and chemists and helping them visualize the market requirements and opportunities is also important. But one of the most important of all those concerned is that group of men who are responsible for the stockholders' money invested in the chemical and fertilizer plants that supply the nation's plant food requirements. Without doubt, individually, they are always welcome at any agricultural college or experiment station; but the opportunity to discuss broad objectives, major require-

ments, trends, and a constructive program for meeting future needs, simply does not exist. Conferences at which educational and industrial officials could discuss both the technical and economic bases for recommendations and the investment and manufacturing problems related to sales opportunities, would probably result in a greatly accelerated progress through changes in manufacturing practices and procedures. Discussions at the top level between the farmers' advisors and suppliers based on sound technical and economic principles are bound to help.

Crops grow in soils; a point which is sometimes overlooked by some fertilizer men and those agronomists who split hairs over fertilizer grades. Granting the universal importance of location, texture, tilth and moisture supply, the relative importance of the fertility of the soil depends largely on the degree to which the farming operation is extensive or intensive. In extensive farming, fertility is all important as it controls the species of plants which may be grown, indicates the type of farming, and determines the fertilizer and soil amendments required for a profitable level of operation.

For Cash Crops

Passing through the intermediate stage in which plant-food elements are purchased for cash crops only, the soil becomes finally, in the most intensive types of farming, merely an anchorage at a convenient location in which to stand and feed growing plants. The plant food normally becoming available represents so small a part of the total requirements that on many soil types it can be ignored. The crop production resulting from the heavy applications of primary plant foods soon creates a relative deficiency for most, if not all, of the secondary and trace elements. Through all this variation of cultural practices, with its maze of variable factors, the trained agriculturist is often not too well oriented, and practical farmers and fertilizer men are frequently at sea in attempting to explain either crop successes or failures.

I will attempt a brief review of some things most of us agree on with respect to applications of primary, secondary, and trace plant food elements; and repeat some questions which we in the fertilizer industry may think are currently important.

Mr. Smith Says . . .

After thirty-three years' experience . . . it is my firm conviction . . . whatever is sound, needs only to be demonstrated and sold; and it will carry itself.

Nitrogen

It is recognized that nitrate may be applied on the surface and, sooner or later, will be absorbed in moisture and carried to plow depth or deeper. It is recognized that ammonia does not leach and therefore should be incorporated in the soil. It is further recognized that organic nitrogen materials are low in the percentage recovered in the crop and that for most crops and soils are worth no more per unit than mineral ammonia.

But, is there a value for nitrate nitrogen, if incorporated in the soil, equal to the cost of oxidizing ammonia to nitrate and the subsequent higher transportation and handling costs? Is it nitrate *per se*, or is it the sodium or calcium that may be combined with it? Is the higher cost of organic nitrogen justified by the finer quality of tobacco, or celery, or other truck crops: or could the same quality be obtained by more frequent applications of nitrate or ammonia in combinations of low salt index?

Phosphorus

The chemical handbooks show the solubility of several phosphates in cold water to be in the following order:

Material	*Solubility in 100 parts water*
Mono Sodium Phosphate.....	112.4
Mono Ammonium Phosphate..	25.3
Mono Potassium Phosphate...	25.0
Mono Calcium Phosphate....	4.0
Di Calcium Phosphate.....	0.028
Magnesium Ammon. Phos.....	0.013

It is thought by some that water solubility may be an important indication of the relative availability of phosphates. It is recognized that soluble phosphates are more readily reverted in some acid soils to iron and aluminum phosphates; and in calcareous soils to tri-calcium phosphate.

Are the water-soluble phosphates more productive per unit? Under what conditions? Would not field experiments with relatively pure compounds as well as with the rather heterogeneous commercial products be worth while? Since reversion is largely the result of surface contact, to what extent does pelleting retard it or prolong availability through one growing season? And why do we continue to make our thinking about the phosphorus and potassium contents of fertilizers more obscure and less direct by using the archaic expressions P_2O_5 and K_2O, when many states have decided to state all other elements in terms of the element? Or don't we really believe in higher analysis fertilizers?

Potash

Except for tobacco, and a very few minor and local exceptions, it is agreed that potassium chloride is an acceptable source of the element potassium. Potassium contributes more to the caloric than to the nutritional value of crops; a differential in values that has a direct relation to the nitrogen-potash ratio. As applied to the soil, it is frequently combined with chlorine, a highly ionized electrolyte element which is easily absorbed by plants, and which affects the intake of both nitrate and sulphate ions. Sodium, of much less importance in plant nutrition, is vastly more important in animal nutrition. Sodium can and does substitute in part for potassium both in the soil and in plants. Our known potash reserves are limited. Our sodium reserves are boundless.

How many of the effects commonly attributed to potash may be due at least in part to the physiological activity of chlorine? Potash salts now supply practically all of

(*Continued on page 26*)

The FUTURE of the Western Phosphate Industry

. . . In this article the authors discuss market areas for triple superphosphate in 17 states

● ● ●

THE costs of manufacturing phosphate fertilizer in the western states is discussed in a series of reports written by Roscoe E. Bell, Associate Director of the Bureau of Land Management, and William H. Waggaman, Senior Mineral Technologist, Bureau of Mines.

The Bell-Waggaman articles were published in the February issue of *Industrial and Engineering Chemistry*. In the first two papers the authors review background information about the phosphate industry, describing the various processes for producing fertilizers from phosphate rock and considering in some detail those processes that have achieved full-scale operation in industry and which seem best adapted to development of a western phosphate industry. The writers offer comparisons of the probable or possible costs of processing phosphate rock by alternate methods in the western areas.

Purpose of Paper

The purpose of the third paper is to translate basic information into terms that will permit approximation of the most economical means of serving the important market areas in the United States, and to evaluate to some extent the competitive ability of western phosphates to serve these markets. The validity of these comparisons is, of course, dependent upon an actual materialization of the conditions assumed in the first two papers.

A possible market area for western triple superphosphate as stated by Messrs. Bell and Waggaman includes 17 states west of Illinois, Missouri, Oklahoma, and New Mexico. This trade area was defined on the basis of transportation costs from the major primary sources of supply, namely Florida, Houston, Texas; and the western phosphate fields. The validity of this definition of trade area depends upon the cost of production at various possible producing points. Its validity also depends upon shipping the same product from the alternate point of production.

The largest U. S. markets for fertilizer are in the Midwestern, Eastern and South Atlantic States. The principal far western markets are along the Pacific coast, especially in California. Ten years ago the consumption of fertilizers in all of the Western states was extremely limited, whereas the markets in the Eastern and South Atlantic States have long been established and manufacturing facilities provided to meet these needs. In recent years the markets of the Western, Midwestern, and Central States have been expanding rapidly, proceeding at an accelerated rate throughout the war years and continuing to grow during the postwar period.

Two Questions

The two questions being asked by potential producers of western phosphate are:

1. Will the present demand for phosphate products decrease markedly when the price of agricultural commodities begins to drop?

2. Can products manufactured from western phosphate rock be delivered to large, well-established markets at a cost permitting them to compete with those produced from Florida and Tennessee phosphate rock?

The uses for phosphate products for purposes other than fertilizers have been developed to a remarkable degree. In addition to such long-established phosphate products as baking compounds, detergents, sugar refining, and medicinal preparations, there are relatively new and expanding uses for phosphoric acid and its compounds. These include rust-resisting coatings, plastics, ceramic products, lubricant additions, water conditioners, textile-processing compounds, insecticides, catalysts, and improved animal-feed supplements.

The fertilizer industry, however, has been and always will be the main consumer of phosphate rock; hence, in planning any large western development, the existing and potential demands for fertilizers are of prime consideration.

Future Estimates

Estimates of future fertilizer markets are difficult to make, but if certain fundamental and irrefutable facts, are considered, the inevitable conclusion is that the consumption of phosphate fertilizers must continue to increase.

According to the authors, in the light of present knowledge and experience, the following general conclusions concerning the future of the western phosphate appear warranted.

1. Both the electric-furnace and sulphuric-acid methods for producing concentrated phosphate products

(*Continued on page 26*)

HUTCHINSON TO HEAD APFC CONTEST JUDGES

The latest development in the Nation-wide essay contest sponsored by the American Plant Food Council and National Grange is the acceptance, by Knox T. Hutchinson, Assistant Secretary of Agriculture, of the chairmanship of the board of judges for the event. Clifton A. Woodrum, president of the APFC made the announcement.

Secretary Hutchinson succeeds Albert J. Loveland, who recently resigned as Under Secretary of Agriculture.

Knox T. Hutchinson

Other Judges are: Dr. Hugh H. Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture; Miss Lois M. Clark, Assistant Director, Division of Rural Service, National Education Association; Dr. W. T. Spanton, Chief, Agricultural Education Service, U. S. Office of Education and Dr. M. L. Wilson, Director of Extension Work, USDA.

Mr. Hutchinson will personally present the awards to the six National winners at the 1950 Convention of the American Plant Food Council on Saturday, July 1. The Convention, which begins June 29 and ends July 2, will be held at The Homestead, Hot Springs, Virginia.

"More than 20,000 young men and women representing the 48 States and the District of Columbia participated in the 1949 contest and we confidently expect an even greater participation this year," Mr. Woodrum said. "Certainly the problems of replenishing, maintaining and increasing the fertility of our soils is one of the most important subjects confronting agriculture today and the fertilzer industry is making notable efforts to stimulate more interest and action among our farmers of tomorrow."

In accepting the Chairmanship of the Board of Judges, Assistant Secretary Hutchinson said that "this contest is reaching so many people and interesting them in such a vital problem as our soil fertility and its conservation is rendering a very valuable service to our Nation," adding that "you (the Council) and your cosponsers (the National Grange) are to be congratulated on such a worthwhile contribution to our National well-being and security."

Prizes totaling $10,000 will be awarded National and State winners

---

I. M. & C.'s $4,000,000 EXPANSION IN FLORIDA

The Polk county phosphate fields, Bartow, Fla., will be expanded and developed further as part of a new phosphate chemical program by International Minerals & Chemical Corporation. Speaking before a joint meeting of all civic clubs in Bartow, Louis Ware, president of IM&C, made the announcement of the $4,000,000 plans.

The four principal projects in International's new program, include:

1. Plans for the purchase of a site and the erection of a new office building as headquarters for the company's Florida phosphate operations.
2. Plans for construction of a new plant for the manufacture of multiple superphosphate and phosphate chemicals, and plans also for a new sulphuric acid plant.
3. Plans for the construction of a new, modern machine shop, warehouse and service center to serve all of the company's Florida operations.
4. Plans for erection of a new Phosphate Division analytical laboratory.

In announcing the new chemical plant, Mr. Ware said it marks the entrance of the company into an entirely new field, that of phosphate chemicals.

He said, "The new program will result in various benefits to the company and its employees. The laboratory, office building, machine shop, warehouse and service center will improve working conditions, and newer and more modern equipment will increase efficiency. These are improvements that have been needed for several years, but especially so at a time such as this when we have mounting costs of production and operation, and with growing and more highly competitive sales problems facing our products."

SPENCER AND DAVISON CONSIDERED BY ARMY

A bid of $2,500,000 for purchase of the Army's Ohio River Ordnance Works at Henderson, Ky., was submitted recently by Spencer Chemical Company, Kansas City, Mo.

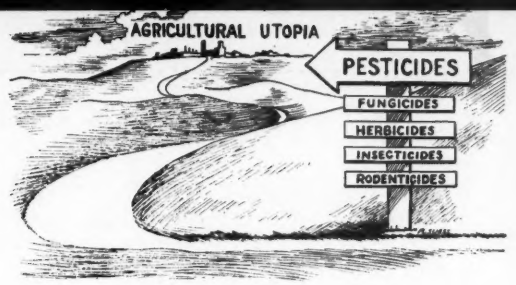
Spencer, the only company to make a bid, also offered to lease the ammoniating oxidation facilities at the Indiana Arsenal, Charlestown, Indiana.

The huge nitrogen facilities at Henderson, Ky., have been operated for the Army by Solvay Process Company for the production of fertilizer material for the Army overseas fertilizer program. This program has now ended and the Army expects to be completely out of the fertilizer business by the middle of April.

Davison Chemical Company, Baltimore, informed the Army it would discuss terms for operating the plant if all other bids are rejected.

Col. John L. Person, United States Army district engineer at Louisville, stated he intends to recommend that negotiations be entered into with both Spencer and Davison.

The Army has also put its San Jacinto, Texas, ammonia works up for lease to private industry. Four offers are now under consideration. They were made by Best Fertilizer Company, Shell Chemical Company, R. S. Mueller, Baltimore, and Zook & Sandness, Wilmington, Illinois.



What's NEW In The PESTICIDES Field

● By Dr. Donald E. H. Frear
Dept. of Agr. Chemistry
Penn State

THE YEAR 1949 saw no startling developments in the fields of insecticides, fungicides and herbicides, but rather a steady advance in our knowledge of the materials already available. Extensive scientific research by industrial organizations and by Federal and State agencies has given us considerably more information on the uses, properties, and limitations of a number of new pesticides. In a number of cases, new common names have been assigned to materials already in use. In this short article we will review the most important of this new information for your guidance in 1950.

Insecticides

Possibly the most important development in insect-control chemicals during the past year was the commercial production of the pura gamma isomer of benzene hexachloride. Preparations of benzene hexachloride (BHC) have been known to be efficient insect killers for a number of years, but the characteristic persistent musty odor of the substance made its use objectionable on food or feed crops. Commercial benzene hexachloride is a mixture of several related forms, called isomers. Of these, the gamma isomer is by far the most effective insect killer. This is now available in commercial quantities and in a highly purified, odorless form called LINDANE. Lindane is formulated as a dust, liquid, and wettable powder, and is finding wide use for the control of many household and agricultural pests. Houseflies which have developed a resistance to DDT are apparently easily controlled by lindane; livestock and barn spraying with this material gave excellent results last year.

DDT continues to be useful against many insects, but it appears that houseflies in some areas are becoming immune to it. There is also evidence that DDT, when present on forage or when applied to dairy cattle, is excreted in the milk. For this reason, it should not be used under these conditions. METHOXYCHLOR, on the other hand, is much less toxic to higher animals, and may be used safely on dairy and other cattle, and on forage crops. Against insects, it acts much like DDT. Another relative of DDT called TDE or DDD seems to be quite specific in its action, and is finding considerable use against the corn ear worm and certain leafrollers.

Organic Insecticides

Among the other chlorinated organic insecticides, CHLORDANE continues to be one of our best materials for household and turf insects. Cockroaches, ants and Japanese beetle grubs are easily controlled by this compound. Two new compounds related to chlordane, designated as HEPTACHLOR and DIELDRIN have considerable promise, but further work is indicated. TOXAPHENE, a chlorinated camphene, has proved to be effective against cotton insects, grasshoppers, and other agricultural pests.

Two members of the organic phosphate family, TETRAETHYL PYROPHOSPHATE (TEPP) and PARATHION, have established themselves as highly efficient insecticides. However, they are both extremely toxic to man and animals, and great care should always be used in mixing and applying them; an efficient mask should always be worn when working with these substances. After application, TEPP is broken down rapidly. Parathion is decomposed less quickly, and should not be applied to food crops less than one month before harvest. If these precautions are followed, there is little danger from toxic residues. If used with care and following directions given by the manufacturers, these compounds promise to be very useful insecticides.

Fungicides

New common names have been assigned to several organic fungicides which have been on the market for several years. These have been coined for common use to replace some of the jaw-breaking chemical names which have confused users in the past. FERBAM has been chosen as the generic name for ferric dimethyl dithiocarbamate, a fungicide having rather wide use on fruits. ZIRAM is zinc dimethyl dithrocarbamate, a related compound used on tomatoes, celery, potatoes and other field crops for fungus control. NABAM and ZINEB designate respectively disodium and zinc ethylene bisdithiocarbamates, which are suggested as

(Continued on page 24)

Another in the new series of Pesticide articles by authorities. Future issues of AMERICAN FERTILIZER will carry more news of this field.

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ANOTHER LOOK

May we take this space in this issue to say thanks for the many kind expressions from our readers on the "new look" of AMERICAN FERTILIZER the pioneer journal in the field.

We also want to invite you to take another look.....

Yes, take another look at this, your magazine, and comment on what you see.

After all, it is your magazine, and we of the staff only make the black marks on the white paper in response to what you ask for in each issue.

As you may have already noticed, with this issue we are continuing our section on pesticides, and introducing a new department written with the salesmen in mind. Here and there tucked away in the paragraphs you will note other minor changes—changes suggested by our readers.

We hope you like, and continue to approve and help improve, this magazine. Future issues of AMERICAN FERTILIZER will include other innovations, and more new departments. We are making these changes and adding these features at your request. We know you have other ideas so why not sit down now, and send us one or two of them. Believe us, it will be appreciated.

Tell us just what you would do if you were the Editor of AMERICAN FERTILIZER.

What artibles do you read?

What features would you add?

What changes would you make?

Perhaps you have "filed away" in that bottom desk drawer some notes, clippings, pictures, or other odds and ends which you have planned many times to mail to AMERICAN FERTILIZER.....but you just never have gotten around to it.

Why not send the materials, and a letter, on to us today. Give AMERICAN FERTILIZER your sincere opinion on just what you like,(or do not like) about this 56 year old publication.

Our recent editorials on public relations within the industry have increased the mail from our readers. Several of the exclusive features in

the last few issues have made comments heard, and overheard, on our field trips much "saltier."

That is just what we like

A magazine which is sincerely trying to do a top flight job for the industry it represents, must never be timid on problems of vital importance to the readers. AMERICAN FERTILIZER does not intend to "romance" the fertilizer folks on facts. The potash strike story in the last issue made this clear.

We will try to print what you, as a group, want to know about your industry. We will make every effort to get the facts correct, but we really need your cooperation. Without your help we are unbale to give the straight news.

Will you help us now in one way?

Just drop a short note today to AMERICAN FERTILIZER and tell us your thinking on the matters we have discussed in the above paragraphs. It will help us, and help you by assuring the members of the fertilizer industry a fine, accurate publication of which they can be proud and in which they can believe.

THE NEXT MOVE IS YOURS. THANKS

FSS OPENS BIDS FOR KOREAN FERTILIZER

After several false starts and bid mix-ups the Korean-ECA fertilizer situation is clearing up.

Importers offered the government its requirements of nitrogenous fertilizer materials for the ECA-Korean account at prices ranging from several dollars per ton below to several dollars per ton above the best offers of American sources at the bid opening of the Federal Supply Service on April 3.

FSS had asked for bids on 12,000 tons of nitrogen, stating material would be acceptable that tested 16 per cent nitrogen.

It was stressed that early deliveries were important in bid consideration. The invitation called for one-half of the supply to be delivered by May 15. In the bids received, twelve offers were made to supply the nitrogen in the form of sulphate of ammonia. Nine additional offers were made to supply the nitrogen in other forms.

Offers to supply the nitrogen in the form of sulphate of ammonia in bulk were made by the following:—

U. S. Steel Export Company; Nitrogen Products, Inc.; Best Fertilizers Company, Oakland, Calif.; Philips Chemical Company, Bartlesville, Okla.; Barrett Division, Allied Chemical & Dye Corp.; Smith-Douglas Company.

The following offered nitrogen in forms other than sulphate of ammonia:—

C. B. Fox Company, New Orleans, La., 60,000 tons of calcium ammonium nitrate from Austria Nitrate Works, Linz, Austria.

Far East Metals Corp., San Francisco, Calif., 60,000 tons of calnitro, from Stickstoff Werke, Linz, Austria.

H. J. Baker & Bro., New York, 65,000 tons of ammonium sulphate-nitrate, from Kohlenwertstoff, the Ruhr, Germany.

North American Cyanamid, Ltd., New York, 30,000 tons of ammonium nitrate.

International Ore & Fertilizer Company, New York, 30,000 tons of ammonium nitrate.

Shepard Chemical Corporation, New York, 50,000 tons of ammonium nitrate.

Harold E. Biggs, New York, 30,000 tons of sodium nitrate, from Chilean Nitrate Sales Corporation.

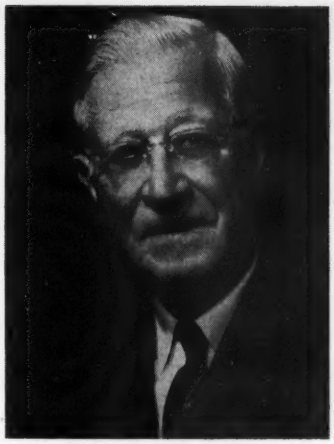
Handelsonderneming (Blitex), Amsterdam, Netherlands, 16,000 tons of sodium nitrate, from Coblenz (Comptain), Brussels, Belgium.

COMMERCIAL SOLVENTS ELECTS MINER TO BOARD

Carl S. Miner, Director of Miner Laboratories, Chicago, has been elected to the Board of Directors of Commercial Solvents Corporation, according to Major Theodore P. Walker, Chairman of the Board.

Mr. Miner, in his capacity as consultant, serves on the research committees of a number of corporations. Through his collaborative efforts, many important processes such as furfural manufacture and the preparation of a low-cost riboflavin supplement from fermentation residues has been developed. He has also been instrumental in developing corrosion inhibitors for glycerol anti-freeze solutions, formulas for writing inks, hydrogenation of carbohydrates, quick-cooking cereals, and exploded vermiculite.

In recognition of his achievements, Mr. Miner in 1949 was awarded the Perkin Medal at a joint meeting of the American Chemical Society and the Society of the Chemical Industry. In 1940 he received the Modern Pioneer Medal.



Carl S. Miner

COVER PICTURE

Just for a different touch our AMERICAN FERTILIZER cover this issue shows Illinois County Agent Herald K. Rippey doing some simple alchemy with a routine soil test. Mr. Rippey was featured in the *Saturday Evening Post* two years ago as a "typical county agent." Norman Rockwell, famous illustrator, did a four page series of paintings and drawings of the man and his work. *National County Agent and Vo-Ag Teacher* also carried a cover photograph and a feature on County Agent Rippey, written by Francis Murray, assistant in extension information at Purdue. The cover photograph shows Mr. Rippey testing soil for Merle Scholer, local farmer.

POTASH INSTITUTE GRANTS $1,000 TO WSC

Western research on soils at Washington State College has just been given a $1,000 boost by the American Potash Institute, Inc. The Western Washington Experiment Station received the grant for work during 1950, said Director Mark T. Buchanan.

The new appropriation makes a total of more than $5,000 given by the organization of fertilizer manufacturers since 1942.

The funds will be used in work directed by Dr. Karl Baur, associate soil scientist at the Puyallup Research station, to learn more about fertilizer needs of western Washington soils. Funds from the institute have been used for equipment used in soil studies and for plant analysis in the Western Washington station's soils laboratories.

In addition to the grant, member companies of the institute are giving six tons of granular muriate of potash, two tons of sulphate of potash and a half ton of "Borax."

Other grants of materials for soils work at the Western Washington station that will be used during the 1950 season are six tons of superphosphate from Simplot Fertilizer Co., Pocatello, Ida.; 1,000 pounds of calcium nitrate from Wilson-George Meyer Co., Inc., San Francisco; 1,000 pounds of sodium nitrate from Chilean Nitrate Slaes Corp., Los Angeles, and 200 pounds of "Nugreen" nitrogen fertilizer for foliage application from Dupont Co., Berkley, Calif.

JOINS BAG SALES STAFF

FRANK L. SMITH, new member of Arkell and Smith's Central Division Sales Staff at Columbus, Ohio. Mr Smith, well known throughout the Midwest, was formerly in the sales division of the Cincinnati Cordage and Paper Company. He will handle sales in the Pittsburgh area

SWIFT GIVES $120,000 FOR AID TO RESEARCH

Eighteen universities, colleges and other research institutions in the United States and two in Canada were recent recipients of grants, totaling more than $120,000, by Swift & Company to support long-range basic scientific studies in agriculture and shorter term research projects in human nutrition.

Dr. Roy C. Newton, vice president in charge of research, says this brings the total of awards from Swift & Company for basic research to more than $2,000,000 in the last ten years.

Twelve of the research grants will underwrite long-range agricultural studies. They will support projects extending over a period of from one to five years. Since this part of the company's research program was started eight years ago grants have been made to 39 different universities and colleges.

Dr. Newton commented, "The broad scope of the basic studies ties in with the growing interest in nutrition. The roots of good nutrition are planted in the soil—in growing crops, livestock and poultry, and animal feed. It is tied up with the processing and distribution of food.

"We believe our grants fill an important need. This nation has been using up its storehouse of basic scientific facts faster than it has added to it. If industry is to continue its fast pace of applied research—attacking the day-to-day problems in its laboratories—it must be fortified with basic scientific facts upon which to build.

"Use of the findings in these research projects is placed entirely in the hands of the universities and colleges. Published results are available to all research workers."

Among the universities and colleges receiving grants for long-range agricultural research projects this year are: Rutgers University: "A Study of Minor Elements in the Soil"; University of Florida: "Effect of Phosphates in Conserving the Trace Elements"; University of Georgia: "Winter Pasture Research."

BONE MEAL TANKAGE BLOOD

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FERTILIZER MATERIALS MARKET

NEW YORK

Sulphate of Ammonia Shipments Slowing Down. Supply of Chemical Nitrogen Adequate for Current Season. Prices on Organic Materials Drop. Shipments of Superphosphate Pick up. European Potash Arrives. Domestic Producers Catching Up on Shipping Schedules

NEW YORK, April 12, 1950.

Sulphate of Ammonia

While some additional export orders were reported, domestic fertilizer manufacturers were rather slow in ordering out material on contract and some plants were reported to have considerable stocks on hand. No change in prices were reported.

Nitrate of Soda

A little better movement of this material was reported but supplies were ample to take care of buyer's needs.

Ammonium Nitrate

Demand continued good for this material and producers were busy filling existing contracts and not inclined to take any new orders.

Nitrogenous Tankage

Some producers are reported sold up until the fall and demand for spot material is excellent and hard to locate. Prices range around $4.00 per unit of ammonia ($4.86 per unit N). f.o.b. shipping points.

Castor Pomace

Sales continue to be made at $30.50 per ton, f.o.b. production points and material for quick shipment was hard to locate. Demand continues good from most sections.

Organics

The demand for blood for both fertilizer and feed was rather poor and the prices declined to $6.75 per unit of ammonia ($8.20 per unit N), f.o.b. shipping point. Tankage was in somewhat better demand and last sold at $7.75 per unit of ammonia ($9.42 per unit N) f.o.b. Eastern shipping points. Soybean meal, after a sharp advance, registered a decline and was quoted at $59.00 per ton in bulk, f.o.b. Decatur Ill. for prompt shipment, but some re-sale material was said to be available slightly lo ver in price. Cottonseed meal sold at $65.00 per ton f.o.b. Southeastern points, and linseed meal was firm.

Fish Meal

Demand for fish meal from the feed trade was poor and increased offerings of imported material eased up prices. No reports of sales of menhaden were current, although at about this time of year the fish factories generally sell part of their estimated catch for the season on a "when and if made basis."

Bone Meal

A good movement was reported for fertilizer but demand from the feed trade was rather poor and most prices were being shaded. A considerable quantity of imported feeding bone meal has recently arrived at various ports.

Hoof Meal

A little easier tendency was noted for this material in line with the lower price of blood and the market was said to be about $7.00 per unit of ammonia ($8.51 per unit N) f.o.b. Chicago.

Superphosphate

A better movement of this material was reported and stocks at some points were cut down appreciably. No price changes were noted and triple superphosphate was extremely short in some sections.

Potash

With some large recent arrivals of European muriate and sulphate of potash, this material was slightly better as far as supplies were concerned, although some of the domestic producers are still about ten days behind on their shipping schedule.

PHILADELPHIA

Market Quiet. Potash and Triple Superphosphate in Greatest Demand. Organics Situation Easier.

PHILADELPHIA, April 12, 1950

There are no unusual developments in the raw materials market. Spot potash is in demand in a few instances and triple superphosphate continues in scant supply. Nitrogenous tankage remains in tight supply, but blood, tankage and bone meal are weaker. It is believed that the country's fertilizer output this season will be less than originally expected.

Sulphate of Ammonia—While converter's grade is reported quite tight, the coke-oven production is in fair supply and ample for present requirements.

Ammonium Nitrate—Production is principally under contract and the supply position is reported tight.

Nitrate of Soda—Demand is seasonably fair with stocks in plentiful supply, and no price changes.

Blood, Tankage, Bone—Blood and tankage are in rather easier position and limited demand. Blood was quoted under $7.00 per unit of ammonia ($8.51 per unit N), with tankage at $7.50 to $7.75 ($9.12 to $9.42 per unit N), in the East, but 25 cents to 50 cents per unit higher in the West. Bone meal is more or less nominal at $58.00 to $62.50 per ton. Foreign offerings of bone tend to keep the domestic market down.

Castor Pomace—Production con-

tinues unequal to the demand and there are no offerings in the market.

Fish Scrap—Not much buying interest. 60% Menhaden meal was offered at $145.00 per ton, the market being considerably affected by foreign offerings.

Phosphate Rock—Foreign demand has quieted down but domestic movement shows improvement and is expected to get better as the superphosphate situation develops.

Superphosphate—Triple grade continues scarce and the demand has increased. The supply position of normal grade has also tightened but no price changes are reported.

Potash—Although domestic production is reported to now be practically back to normal, there is still fair demand for spot. Quite a large tonnage has arrived from abroad but it is suggested that some of the deliveries are several weeks late.

CHARLESTON

Material Supply Situation Fairly Satisfactory. Potash and Concentrated Superphosphate Still Short.

CHARLESTON, April 10, 1950

Potash continues short of demand and supplies of normal superphosphate are getting tighter. Triple superphosphate demand is far in excess of supply. Organic ammoniates continue short of demand and the market strong. Mineral nitrogen is in good demand and supplies generally adequate.

Organics—Organics for prompt shipment continue in tight supply. Producers of domestic nitrogenous have sold a limited tonnage for summer and fall shipment at prices ranging from $3.75 to $4.10 per unit of ammonia ($4.56 to 4.98 per unit N) in bulk, f.o.b. production points, depending on its location. Blood and tankage demand has slackened resulting in lower levels of price. Imported nitrogenous has been sold recently for summer and fall shipment at $4.65 and $4.75 per unit of ammonia ($5.65 and $5.77 per unit N) in bags c.i.f. Atlantic port, but offerings are extremely light.

Castor Pomace—Production continues limited with movement primarily against existing contracts. Last sales were made at $30.50 per ton in bags f.o.b. Northeastern production points for summer shipment.

Dried Ground Blood—Market is described as stagnate, with Chicago prices indicated at around $6.50 per unit of ammonia ($7.90 per unit N) in bulk.

Potash—In spite of normal production, shipments are about one week to ten days behind due to increased demand. Good supplies of imported material are expected during April at Atlantic ports.

Ground Cotton Bur Ash—Sales continue for this source of carbonate of potash, maintaining production at capacity level.

Phosphate Rock—Domestic demand continues steady and slightly increasing. Stocks are adequate with prices firm.

Superphosphate—Demand has increased considerably tightening the supply of normal Superphosphate in several areas. Triple superphosphate is in very tight supply and heavy demand.

Sulphate of Ammonia—Synthetic material is now in tight supply, but overall supply of coke oven and synthetic appears sufficient to meet the demand. Prices are firm.

Ammonium Nitrate—Demand exceeds supply for both imported and domestic ammonium nitrate.

Nitrate of Soda—Demand has increased considerably in proportion to seasonal needs for top-dressing crops. Stocks continue adequate and prices unchanged.

CHICAGO

Organics Market Steady but Increased Production Indicates Possible Easing in Near Future

CHICAGO April 10, 1950

The market on animal ammoniates in the Middle West remains approximately steady. There are, however, some indications that more material is being produced than the present buying interest can absorb, and consequently an easier tendency is coming apparent. Present indications are that there is not much chance for the market doing any better, and unless buying becomes more aggressive there is a possibility that prices will decline.

Meat scraps 50% protein, ground and sacked, are still unlisted at $105.00 to $110.00 per ton, but movement at this level is very slow. Digester tankage 60% protein, is also listed at $105.00 and $110.00 per ton, but like meat scraps selling opportunities are very limited. Dry

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rendered tankage, unground, is moving in very moderate quantities at $1.90 per unit of protein. Wet rendered tankage is held at $8.50 per unit of ammonia ($10.33 per unit N) for high testing product, and $9.00 to $9.25 ($10.94 to $11.24 per unit N) for low test. Dried blood last sold at $6.50 per unit of ammonia ($7.90 per unit N) delivered, and further quantities are available at this price. Steamed bone meal in bags, 65 per cent B.P.L. is listed at $70.00 per ton, and raw bone meal 4½—45 per cent at $60.00 to $65.00 per ton.

MONSANTO PRODUCTS AID FRUIT EFFORT

In preliminary work last summer, plant scientists of the University of California produced lemons two and three times larger than normal by spraying the trees with tiny amounts of 2,4,5-trichlorophenoxyacetic acid.

Both 2,4,5,-T and its relative 2,4-D, produced by Monsanto Chemical Company of St. Louis, have been used as weed and brush killers.

The California scientists, warning that proper dosage and timing are important, reported that about three tablespoons of 2,4,5-T in 500 gallons of water increased the rate of lemon growth when sprayed on the trees. It also delayed yellowing of lemons on the tree and in storage, and prevented ripe lemons from dropping.

Researchers feel that these new developments may revolutionize fruit production, and result in larger fruit, controlled ripening to meet varying demands, and prevention of dropping until fruit can be picked.

Fertilizer Prospects for 1950

From The Farm Cost Situation, published by the Bureau of Agricultural Economics, U. S. Department of Agriculture

Lower farm prices may result in some slackening in demand for mixed fertilizers for the 1950 crop season. On the other hand, farm product prices in relationship to fertilizer costs are still favorable to increased use of fertilizer. Also farmers have learned more about using fertilizers and the response in yields to their use. This will tend to keep up fertilizer consumption near current levels. The recent strike at the Carlsbad mines was responsible for loss of about two months production of potash but this is being partially overcome by imports.

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Because of high demand for ammonium nitrate in some sections during the next two months, this item apparently will not be in sufficient supply to meet all requests. However, except for localized seasonal tight spots, supplies of other nitrogenous materials are expected to be adequate to meet demands during 1950. Phosphates are expected to be adequate throughout the season. This spring's supply of potash will be fair but will reflect the curtailed production of last winter. Adequate supplies are expected during the subsequent months.

Price Levels

Prices of fertilizer in 1950 are expected to remain near levels of 1949. Slightly lower wholesale prices of some of the materials used for nitrogenous fertilizers are offset by higher freight costs so that prices to farmers will probably be about the same as for the past year.

One way of figuring fertilizer costs for individual farmers is in terms of the value of yields sacrificed by not using enough fertilizer. Surveys of fertilizer use on farms for the year 1947 indicate that considerably more nitrogen is being used on corn in the Eastern and Southern States. On farms in North Carolina where corn was fertilized, 96 per cent of the acreage was treated at an average rate of about 250 pounds per acre. The most common grades used were 4–10–6 and 16–0–0.

About one-third of the farmers interviewed in North Carolina that used fertilizer on corn, applied straight nitrogen material (mostly 16–0–0). About half of these had previously applied a complete fer-

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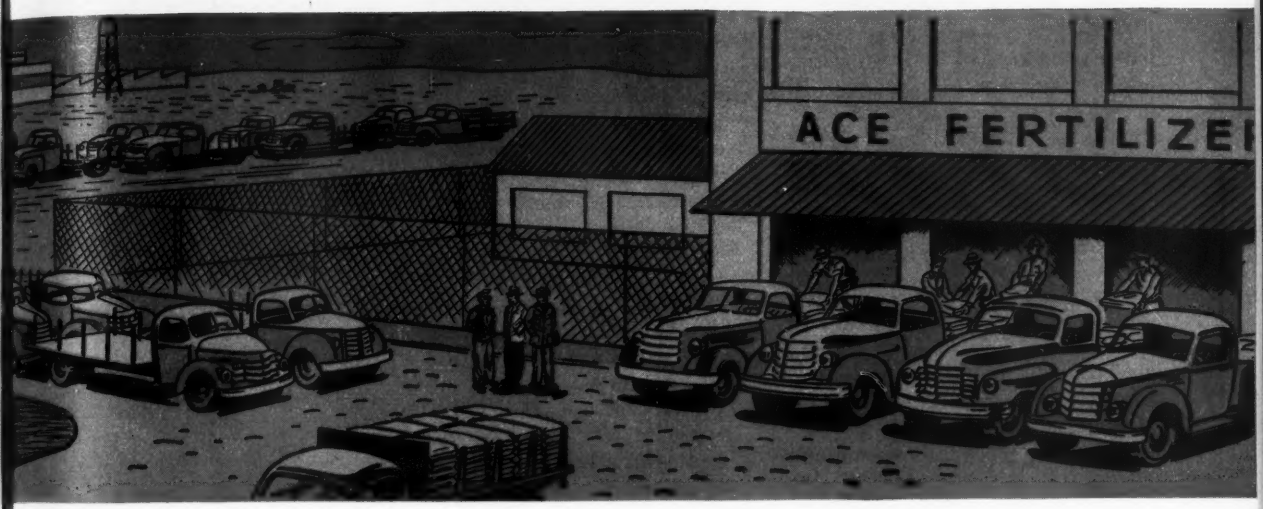

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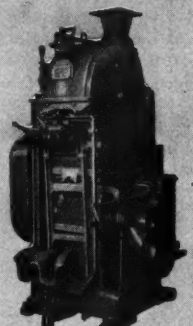

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tilizer such as 4–10–6 or 5–10–5. Where both complete and straight nitrogen fertilizer was applied on corn, the average rate was 340 pounds of complete fertilizer, followed by approximately 110 pounds of 16–0–0 as a side dressing. In terms of plant nutrients (nitrogen, phosphoric acid, and potash) the average rates per acre were 68 pounds in complete fertilizer and 18 pounds in straight nitrogen materials.

These average rates seem quite low when compared with response obtained from fertilizer applications on corn in some areas. For example, experimental results in North Carolina on loamy sand indicate that when 180 pounds of plant nutrients (20, 80, and 80 pounds of N, P_2O_5, and K_2O, respectively) had been applied at planting time as much as 150 pounds of nitrogen in some form (an equivalent of 900 pounds of 16–0–0) as a side dressing would have paid its way under fertilizer-price relationships existing in 1947. An average of only about 110 pounds of 16–0–0 was applied as a side dressing on the farms surveyed. It appears that side applications of this amount are far below the most profitable rates under current-price relationships. The data from the North Carolina experiments are presented only as an illustration of the problems of determining the most profitable rates of fertilizer application. Results obtained from different types of fertilizer used and rates of application depend much on type of soil, crop, and climatic conditions.

Proper placement of fertilizer in the soil is an important item in getting maximum yields from applications of fertilizers. This is particularly true in the case of phosphates which do not move readily in the soil after application. The proper combination of fertilizer and moisture is essential and this means getting the fertilizer somewhat below the surface and reasonably close to the seed. It is important also to obtain an adequate concentration of fertilizer in the root feeding area rather than to scatter the phosphate throughout the soil mass. Doing these things helps to obtain more nearly normal response especially in seasons when there is a shortage of moisture. General recommendations for getting phosphate fertilizer applied in proper concentration near the plant root area apply also to irrigated crops and yet much of the phosphate used under Western irrigation conditions aside from that used on sugar beets is still applied as a surface treatment.

GROW YOURSELF SOME "BIG ONES" AT HOME

Farmers are finding that fertilizer plays an important role in fish ponds according to the Georgia Agricultural Extension Service. Three hundred to 500 pounds of fish per acre have been produced in ponds where fertilizer was used. Only 50 pounds per acre were produced in unfertilized ponds.

One hundred pounds of 8–6–4 or its equivalent is recommended per acre of pond. It should be applied during the growing season, usually from March to October, at two- or four-week intervals.

Properly fertilized ponds will have a green or greenish-brown color. When this color begins to disappear and objects can be seen through the water at a one foot depth, the pond is ready for more fertilizer.

The old elbow–palm–of–hand method will tell you if your pond needs fertilizer. Plunge your arm into the pond up to the elbow. Turning the palm of your hand toward you, try to see it. If you do see it, fertilize.

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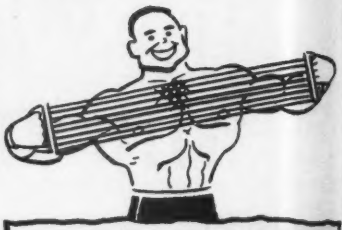

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LINK-BELT SPEEDER ANNOUNCES NEW "VEEP"

Link-Belt Speeder Corporation, affiliated with Link-Belt, announced recently the election of Columbus Basile as vice-president for operations with headquarters in Cedar Rapids. Mr. Basile comes to Cedar Rapids from Chicago, where he has been shop superintendent since December, 1947.

Mr. Basile entered the employ of the Link-Belt Pershing Road Chicago plant in 1928. He did general shop work until 1938. Since 1941 he has successively served as foreman of machine shop at Link-Belt Ordnance Co., Chicago; as head of time-study and methods at the Link-Belt plant in Philadelphia; and as superintendent of the Caldwell plant in Chicago.

EDMUNDS-HUETER START NEW FERTILIZER COMPANY

Edmunds-Hueter Chemical Company, Albuquerque, New Mexico is a newcomer in the group of western fertilizer mixing plants. The company opened April 1 with the office and plant located at 2200 S. 2nd Street, P. O. Box 1016.

Edmunds-Hueter will also sell bagged materials and other products on a statewide basis. Retail sales in Albuquerque will be handled direct.

The company is a partnership of Edward Edmunds, Jr., and John M. Hueter. Mr. Edmunds is an M.I.T. graduate in Chemical Engineering, and has been employed since his graduation ('42) as a process and construction engineer in the fertilizer field. He was associated with Davison Chemical and Phillips Chemical.

Mr. Hueter is a graduate of the University of New Mexico with a degree in Civil Engineering. He also has several years of active farming experience in addition to civil engineering work, both independently and with the City and County of San Francisco.

NEW THEORY ADVANCED FOR INSECTICIDE CONTROL

NEW chemicals that make plants toxic to insects for short periods are being tested by scientists of the U.S. Department of Agriculture, according to Dr. P. V. Cardon, Research Administrator. These chemicals kill insects that suck the juices of treated plants. They are known to the entomologists as "systemic poisons," and should not be used by the public until tested further.

The chemists emphasize the importance of the fact that these materials appear to break down into harmless substances. Some of them appear to be highly selective in the insects they will kill. One kills aphids and mites and apparently none of the other insects on the plants. Studies are needed to determine their effect on beneficial insects such as bees, parasites, and predators.

Studies now are being made to find out if these insecticidal chemicals will break down into harmless compounds within a few days or weeks. If they do, a new approach will be available to American agriculture in the control of some of our most difficult insect pests, according to entomologists of the Bureau of Entomology and Plant Quarantine.

Chemicals most suitible for this purpose in tests, so far, are derived from the inert calcium phosphate rock. This abundant source of the basic insecticidal chemicals is treated to obtain pyrophosporic acid, or oxidized to obtain phosphoric pentoxide. A wide variety of insecticidal chemicals can be derived from these sources.

One of the chemicals applied to the soil will kill European corn borers, in the stalks. Another kills aphids and mites on cotton when tiny amounts of the chemical are applied to the cotton seed prior to planting. Another kills greenbugs when applied as a spray to growing wheat. In the greenhouse, resistant mites are killed with applications of aerosols containing one of the systemic insecticides.

The entomological discovery of these new materials has renewed interest in the idea of controlling insects by injecting or applying insecticides that will be taken into the plant tissues so that insects feeding on them will be killed. Bureau entomologists have studied the problem for many years. But none of the chemicals studied until recently have warranted further investigation.

WHITING ACQUIRES COBURN-FOSTER CONVEYOR COMPANY

The Whiting Corporation, Harvey, Illinois for over 60 years manufacturers of materials-handling equipment, announces that it has taken over the belt and chain conveyor business formerly operated as the Coburn-Foster Conveyor Company, Chicago.

The new acquisition announced by Stevens H. Hammond, President, will serve to broaden the line of the Whiting Corporation.

The chain and belt-conveyor product group will be headed by Gordon Foster, former president of Coburn-Foster, who will work under A. E. Bottenfield, Vice President in Charge of Whiting Merchandise Sales. Mr. Foster has had over 20 years' experience in the materials-handling field.

The conveyor equipment will be manufactured at the Whiting plant at Harvey, Illinois, and Los Angeles, California.

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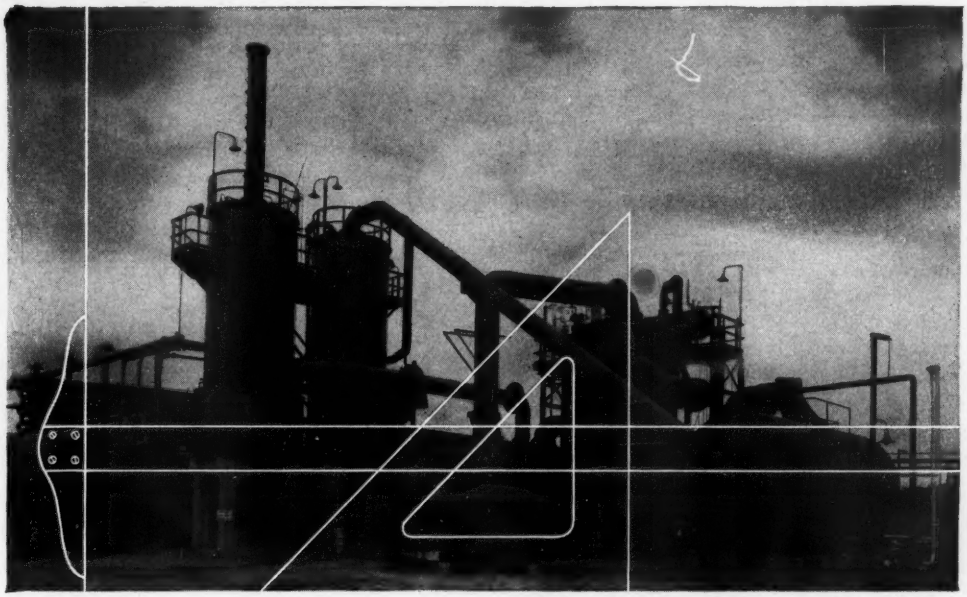

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The SALESMAN'S *Notebook*

WITH THE STORY in this issue by L. C. Hart, vice-president for relationships of the Johns-Manville Corporation, AMERICAN FERTILIZER begins a new section of the pioneer journal of the fertilizer industry: **The Salesman's Notebook.**

This issue we are featuring an article by some one outside of our industry, but in the future issues we would like to include specific ideas and suggestions from our readers on fertilizer salesmanship. We want to ask *your* questions and try and answer *your* problems because AMERICAN FERTILIZER feels that the time has come to tell and sell . . . and swell the sales for our industry. The fertilizer salesman must be something of an agricultural evangelist for the next few years, and we hope the hints and comments in this magazine may be of some small aid in helping him to do a better job. **Mail your ideas in to "The Salesman's Notebook"** today!

A THOROUGH understanding of the vital importance of human behavior, human emotions and human reactions is probably the greatest contributing factor towards the attainment of success in the profession of salesmanship. It is not necessary to develop any profound theories in establishing a pattern of operation. Look for the simple and perfectly obvious feelings, emotions and reactions which motivate human behavior, analyse them in terms of your own human understanding and be guided accordingly.

The personalities and temperaments of people do not vary to such an extreme degree as is customarily thought. We are all quite alike in our emotional reactions and behavior. In many cases, action results from sentiment rather than from logic. Expressions of sentiment by people in all walks of life, according to Dr. Roethlisberger of Harvard University, are neither true nor false. They emerge from the personal and socal life of the individual Apart from such context, they are meaningless.

By L. C. HART
Vice-President, Johns-Manville Corporation, New York

Anyone interested in selling can from his own day-to-day experience develop a "check-list" to serve as a guide in appraising the emotions and sentiments which motivate people's actions. My own are perfectly simple—they are not original—everyone is familiar with them. They are, however, so simple and obvious, that we forget to remember them and apply them in our daily work. Too frequently, we dismiss them as platitudes or maxims. Here are just a few of these simple rules:

1. Diplomacy in selling is the art of letting the other fellow have "your" way.

2. Deliberately overestimate the value and importance of the other person's point of view.

3. Don't try to correct or change feelings of sentiment by logic or argument. "Spar" for time until emotional inflation has an opportunity to deflate itself.

4. Earn the respect and confidence of other people by becoming *genuinely* interested in them rather than by attempting to get them interested in you.

5. In interviewing a prospect or customer, always emphasize "you"—"your" and "yours."

6. Always be sincere. You must be genuinely "yourself." Don't try to impress others by dramatics or by "putting on airs."

7. One of the chief elements in getting along with people is to form an honest appraisal of your own capacities and a just appreciation of your own limitations.

8. "Bright" people should be tolerant and patient when dealing with slow-thinking people. Conversely, in an interview with someone exceptionally well informed on his own "specialty," be a good listener until you feel yourself attuned to his level of "intelligence."

9. Be ever on the alert to recognize irritating traits in others in order to be prompt to correct your own bad habits.

10. Make it as easy as possible for people to be "nice" to you.

Summary of an address at the National Marketing Conference, Detroit, March 1, 1950

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PERSONNEL CHANGES IN BEMIS' KANSAS CITY SALES TERRITORY

Changes in sales personnel are announced by Bemis Bro. Bag Co. at Kansas City.

Harvey C. Wilson was transferred to southern Kansas from the eastern Kansas territory. Mr. Wilson has more than thirty years service with Bemis. He will reside in Wichita.

Replacing Mr. Wilson in eastern Kansas is W. B. Kruse, whose twelve years experience with the company has been in production, procurement and sales work.

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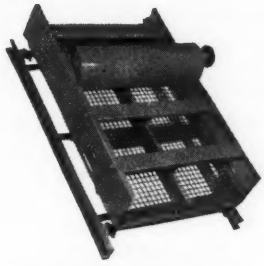

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INSECTICIDES and FUNGICIDES

From *The Farm Cost Situation*, published by the Bureau of Agricultural Economics, USDA

No significant change from the 1949 to the 1950 season is expected in prices of most insecticides and fungicides. Increased transportation costs may bring about minor increases in prices of some items. For the most part, materials needed to protect crops from insects and diseases during the 1950 season are expected to be available. If insects appear in more than average numbers during the 1950 season, supplies of some of the new insecticides may not be adequate to meet all demands. Local shortages may occur under these conditions. However, realizing the advantages of protecting their crops more farmers are ordering insecticides and fungicides well in advance of the season.

Prices to Hold

Prices of insecticides and fungicides in 1950 are expected to remain substantially at the level that prevailed at the end of the 1949 season. Minor increases may result from changes in transportation charges and cost of specialized containers.

The production of insecticidal chemicals such as DDT and benzene hexachloride has been curtailed because of the coal shortage during the early part of 1950. If insects appear in more than average abundance during the 1950 season, supplies of some of the new insecticides may not be adequate to meet all the demands. Local shortages may occur under these conditions. Supplies of arsenical insecticides will be available in quantities sufficient to meet demands in 1950.

For the most part, however, materials needed to protect crops from insects and diseases during the coming season are expected to be available. Insecticides containing rotenone and pyrethrum are expected to be adequate. Insecticides containing Ryania which is used largely to control the European corn borer in canning corn will be available in larger quantities than last year, but the amount may not be sufficient to satisfy all demands.

Realizing the advantages of protecting their crops from pests, many farmers are beginning to order insecticides and fungicides well in advance of the season. For example, during the latter part of 1949 and the early part of 1950 farmers and dealers—particularly in the South—placed orders for insecticides they may need during the 1950 season. Some insecticides such as benzene hexachloride, toxaphene, and DDT mixtures that were available in rather limited supply last season have been stocked for use in the early part of the 1950 season. On this basis, it is fair to assume that the initial part of the insecticides needed to protect next season's crops from insects and plant diseases will be available to meet early season needs. To be prepared to protect their crops, it is important that farmers and local dealers determine as promptly as possible the kinds and quantities of insecticides that they anticipate will be needed, and place orders with their suppliers without delay. This is particularly true of some of the more complex modern compounds.

Pesticides

(*Continued from page 9*)

fungicides on many vegetables and ornamentals. THIRAM (tetramethylthiuram disulfide) is the last member of this group to receive new names. It is recommended as a seed treatment and also used mainly to combat certain fungus diseases of turf.

Considerable interest is being shown in the ZINC and COPPER CHROMATE COMPLEXES as fungicides. These are relatively new, and have not yet been established as standard treatments, but seem to be useful for potato diseases, etc. The GLYOXALIDINES (imidazolines), especially 2-heptadecyl 2-imidazoline, appears to be highly effective against cherry leaf spot, and perhaps will find some use on other fruits.

Herbicides

Although no new herbicides have been developed commercially during the past year, we are gradually accumulating information on those which are of recent origin. Formulations of the AMINE and ESTER types of 2,4-D continue to be the most popular. Recent work has emphasized the volatility of the 2,4-D esters, and indicates that these formulations can cause injury to sensitive crops in the areas near fields sprayed with them. Even though the spray is closely controlled, the vapors of the 2,4-D esters can be carried some distance, and may do damage. 2,4,5-T has lived up to its early promise as a killer of woody plants, and is being used increasingly to eradicate bush, brambles, etc. Recent important price reductions in 2,4-D preparations should make 1950 a banner year for these materials.

TCA (sodium trichloroacetate) is being used in increasing amounts to eradicate quack and other objectionable grasses. The trend appears to be toward spot-treatment, using the material at the rate of 100 to 150 pounds per acre. PMAS (phenyl mercuric acetate) is also being used successfully to eradicate crab grass in lawns.

It has been possible in this short article to cover only the most important of the newer materials. The older materials continue to find extensive use, and they should not be overlooked by the user.

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Phosphate

(*Continued from page 7*)

from Western rock may be expected to have possibilities of economic operation in the Western phosphate fields.

2. Concentrated products manufactured from Western rock by these processes may be expected to serve the Far Western area more economically than ordinary superphosphate derived from Eastern phosphate deposits.

3. Concentrated phosphate fertilizers manufactured from Western rock by the wet process may be expected to be competitive in large Midwestern markets with similar products derived from Tennessee and Florida rock.

4. Concentrated phosphate fertilizers produced by the electric furnace process may be expected to be more costly than concentrated phosphates produced in the East by the sulphuric acid process under the existing freight rates.

5. Concentrated phosphates provide a much cheaper source of plant food to consumers in the Midwest than do oridnary superphosphates. Moreover, western produced (wet or electric process) concentrated phosphates may be expected to compete readily with ordinary superphosphate in this area.

6. Triple superphosphate may be expected to be produced more cheaply by the sulphuric-acid process than by the electric-furnace process in the western area.

7. Since elemental phosphorus carries a lower freight rate per unit of P_2O than concentrated phosphoric acid, the logical procedure for obtaining this acid at points of consumption far distant from the phosphate-rock deposits would be to ship phosphorus to such points and convert it into phosphoric acid close to established markets, wherever the volume of business would justify dividing the enterprise.

Agronomy—Economy

(*Continued from page 6*)

the chlorine contained in fertilizers. Have we eliminated too much of the sodium? Does chlorine have a nutritional value? It has been suggested that chlorine may be active in protecting the photolytic system against inactivation of the enzyme.

On acid and on calcareous soils, in humid and in semi-arid climates, is it not desirable to compare potassium combined as carbonate, bicarbonate, nitrate, chloride, sulphate and phosphate? If a difference in plant nutrition value exists, it might possibly be within the range of difference in cost of production n chemical factories.

Calcium

Calcium is our most abundant and least expensive basic element. In the over-all cation vs. anion balance in our soils, and in plant nutrition, it should be utilized to the fullest extent allowed by maximum production of nutrients for man and beast.

How sharply have we differentiated between limestone applications to change the pH of the soil and calcium as a plant nutrient? Why have we not made more use of calcium chloride (in many places an industrial waste product), and calcium nitrate in our nutrition studies? Or have we assumed that the calcium requirements of crops are automatically taken care of by the calcium phosphate and calcium sulphate in normal superphosphate? Where are such quantities of calcium required, and why must it be transported long distances from Florida, or Tennessee, or Montana?

Magnesium

It is generally recognized that finely pulverized dolomite is a satisfactory source of magnesium for most crops. Unfortunately our deposits of dolomite are none too well distributed with respect to the fertilizer consuming areas, and it is not everywhere available at low cost. The double salt sulphate of potash-magnesia is very effective. Magnesium sulphate separately can be used in mixed fertilizers only if calcined.

What is the nutritional status of magnesium ammonium phosphate, which actually occurs in some mixed fertilizers? Would magensium chloride be an acceptable source for tobacco, in view of some results indicating that dolomite offsets some of the harmful effects of chlorine? Would magnesium chloride be worth the special handling required?

Sulphur

Sulphur, the unsung servant of the fertilizer industry; the stepchild of the plant nutritionists; the element which when supplied in

(*Continued on page 28*)

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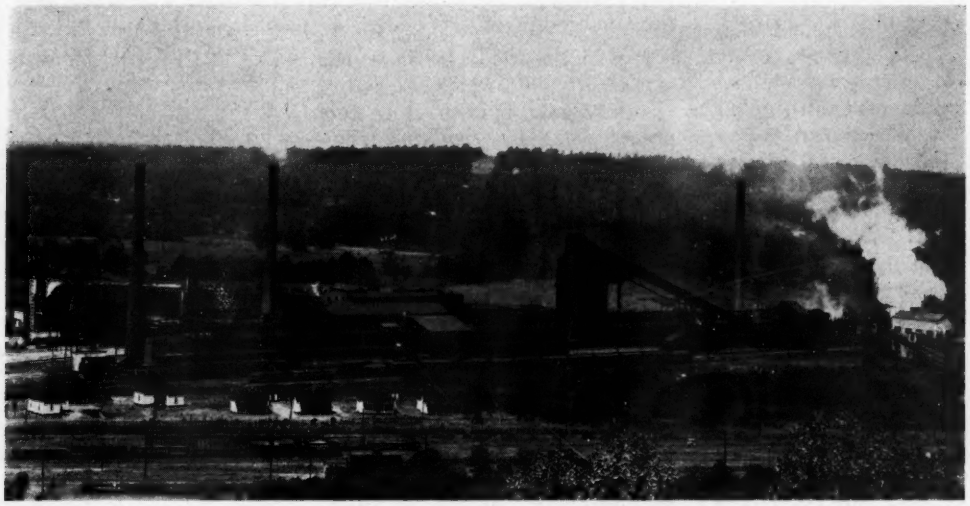

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(*Continued from page 26*)

excess of acid soils leaches and takes with it basic ions that are sorely needed. What do we know about the actual requirements for sulphur for most of our important crops?

The essential difference between the ordinary grades of mixed fertilizers containing less than 30 units of plant foods and concentrated fertilizers is the absence of calcium sulphate in the latter. How much of the sulphur supplied in the usual grades of mixed fertilizers, at the prevailing rates of application, is really needed by the crops? The fertilizer industry as a whole and many individual producers would like to know. if the requirements are not too high, this element is unique in that it can be supplied with the phosphorus, with the nitrogen, or with the potash. It may be supplied also from many conveniently located deposits of gypsum, from which it could be hauled and applied to the soil at convenient intervals in the crop rotation and farm work program.

How many agronomists have a map showing the gypsum deposits in their state? It has not been important? The major areas where sulphur is required can not be defined according to rainfall as they can with lime? Agreed. But it is important to any and every manufacturer of concentrated fertilizers to know if sulphur is an element that must be supplied to the soils of any given state, and if so, whether it can be supplied more economically from nearby gypsum deposits than by shipping it in the phosphate or mixed fertilizers.

Trace Elements

Beyond mentioning that the use of borax in phosphate-potash mixtures for legumes and some other crops seems to be an established economical practice, I will not discuss the minor elements individually This is because, with few exceptions, iron, manganese, copper, zinc, cobalt and now molybdenum are required in very small quantities per acre. On most soils only some of the crops show a yield response to applications of these elements, and frequently it is observed only in connection with certain seasonal or climatic conditions.

It is logical to ask if compounds of these elements, which in quantity seem to be almost in the drug store prescription class, should be combined with a heavy tonnage industry as part of the production program. In the absence of better information or advice, individual growers may be justified in applying a "shotgun prescription" mixture of most or all of these elements. Although they should be offered for sale by fertilizer manufacturers and dealers in the areas where they are needed, the method of applying to best advantage remains to be determined by the research specialists in plant and animal nutrition. Certainly, the hazards of reversion in the soil and the low percentage recovery from the soil should be weighed against the frequently demonstrated more immediate response obtained by spraying them on the foliage or adding them directly to the animals' feed. Even in human nutrition, for some of these elements, it has not been demonstrated that combination in organic compounds gives any higher nutritive values. The narrow margin between deficiency and toxicity for some of these elements is further reason for a separate, deliberate, and more carefully measured application in the form of diluted dusts or sprays.

Soils

There are many things that commercial fertilizer companies would like to know, and should know, about soils. The sources of information are open to all, and perhaps that is something we should teach ourselves and our own organizations individually. More agronomists are needed inside the fertilizer industry. But the adaptation of crops and cropping systems to soil type is a field in which closer cooperation and study are needed both by research agronomists and commercial interests.

I will cite just one example. Flat, highly acid soils of fine texture, which are shallow because of poor drainage during appreciable periods each year, are natural grass land, providing a species of grass tolerant of low pH which will grow in that climate can be found. It is well known that a good sod may recover one hundred per cent of the inorganic fertilizer nitrogen applied to it, up to rather high rates of application. It is further known that the digestible protein content of many grasses can be greatly increased by applying inorganic nitrogen fertilizers.

It would seem that on such soils pasture management and fertilizer studies would be worth while, to the end of developing a profitable grass land agriculture, as differentiated from the more usual legume or mixed grass and legume programs with the attendant high potash requirements.

Conclusions

After thirty-three years' experience in plant nutrition work, ten years in experiment stations and twenty-three years in industry, it is my firm conviction that whatever fertilizers or fertilizer materials, or soil fertility practices, is sound, needs only to be demonstrated and sold; and it will carry itself. What is not agronomically and economically sound should not be pushed, as it will not continue beyond the red ink stage, no matter how much money is spent to promote it.

Agronomists should not confine their interest and research in plant nutrition to products or forms of plant food presently on the market. Any chemical combination which may show superior nutritional values can and will be manufactured if the advantages are equal to the difference in cost of production in volume.

The leaders in the plant food industry are willing and able to alter their production programs to meet the requirements of any soil fertility or crop nutrition program which the agriculturists may show is basically sound and meets the needs of any important agricultural enterprise.

● ●

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Stedman Foundry and Mach. Works, Aurora, Ind.

CASTOR POMACE
McIver & Son, Alex. M., Charleston, S. C.

CHEMICALS
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Barrett Div., Allied Chemical & Dye Corp., New YorkCity
Commercial Solvents Corp., New York City
Davison Chemical Corporation, Baltimore, Md.
Huber & Company, New York City
International Minerals & Chemical Corporation, Chicago, Ill.
Lion Oil Company, El Dorado, Ark.
Koppers Company Inc., Tar Products Div., Pittsburgh, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Phillips Chemical Co., Bartlesville, Okla.
Scar-Lipman & Co., New York City
Spencer Chemical Co., Kansas City, Mo.
United States Steel Corp., New York City
Virginia-Carolina Chemical Corp., Richmond,Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.
Woodward Iron Company, Woodward, Ala.

CHEMISTS AND ASSAYERS
Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Wiley & Company, Baltimore, Md.

CONDITIONERS
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
National Lime & Stone Co., Findlay, Ohio
Quaker Oats Company, Chicago, Ill.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Huber & Company, New York City
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Scar-Lipman & Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

DRYERS
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Mach. Works, Aurora, Ind
Sturtevant Mill Company, Boston, Mass.
Titlestad Corporation, Nicolay, New York City

FERTILIZER (Mixed) MANUFACTURERS
American Agricultural Chemical Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Davison Chemical Corporation, Baltimore, Md.
International Minerals & Chemical Corporation, Chicago
Southern States Phosphate & Fertilizer Co., Savannah, Ga
Virginia-Carolina Chemical Corp., Richmond, Va.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Huber & Company, New York City
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
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- Sturtevant Mill Company, Boston, Mass.

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- Sturtevant Mill Company, Boston, Mass.
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- Sackett & Sons Co., The A. J., Baltimore, Md.
- Stedman Foundry and Mach. Works, Aurora, Ind.
- Sturtevant Mill Company, Boston, Mass.

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- Barrett Div., Allied Chemical & Dye Corp., New York City
- Lion Oil Company, El Dorado, Ark.
- Phillips Chemical Co,, Bartlesville, Okla.
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NITROGENOUS ORGANIC MATERIAL
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- International Minerals & Chemical Corporation, Chicago, Ill.
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- Monsanto Chemical Co., St. Louis, Mo.
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- American Potash and Chemical Corp., New York City
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Universal Vibrating Screen Co., Racine, Wis.

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Virginia-Carolina Chemical Corp., Richmond, Va.

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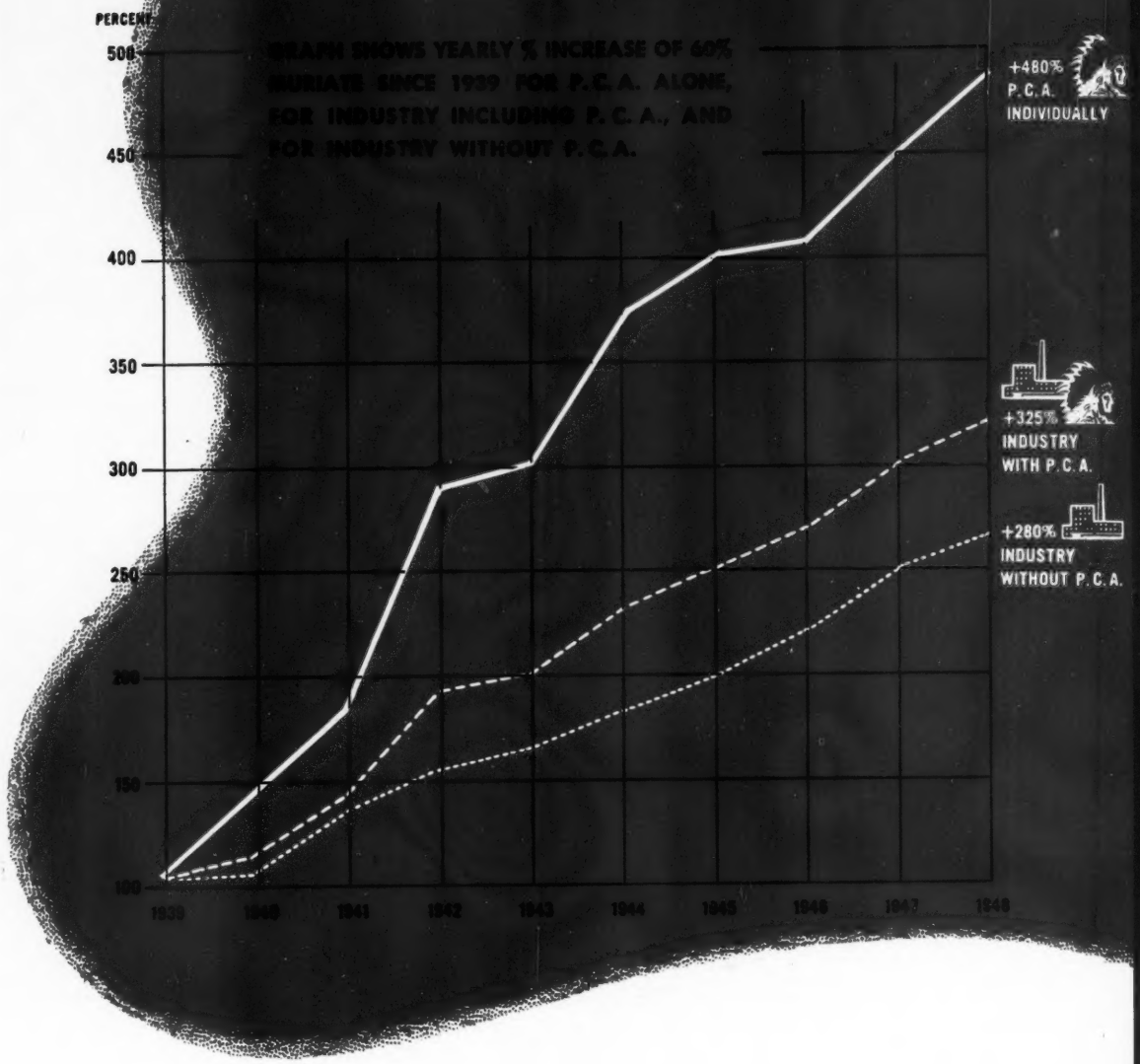

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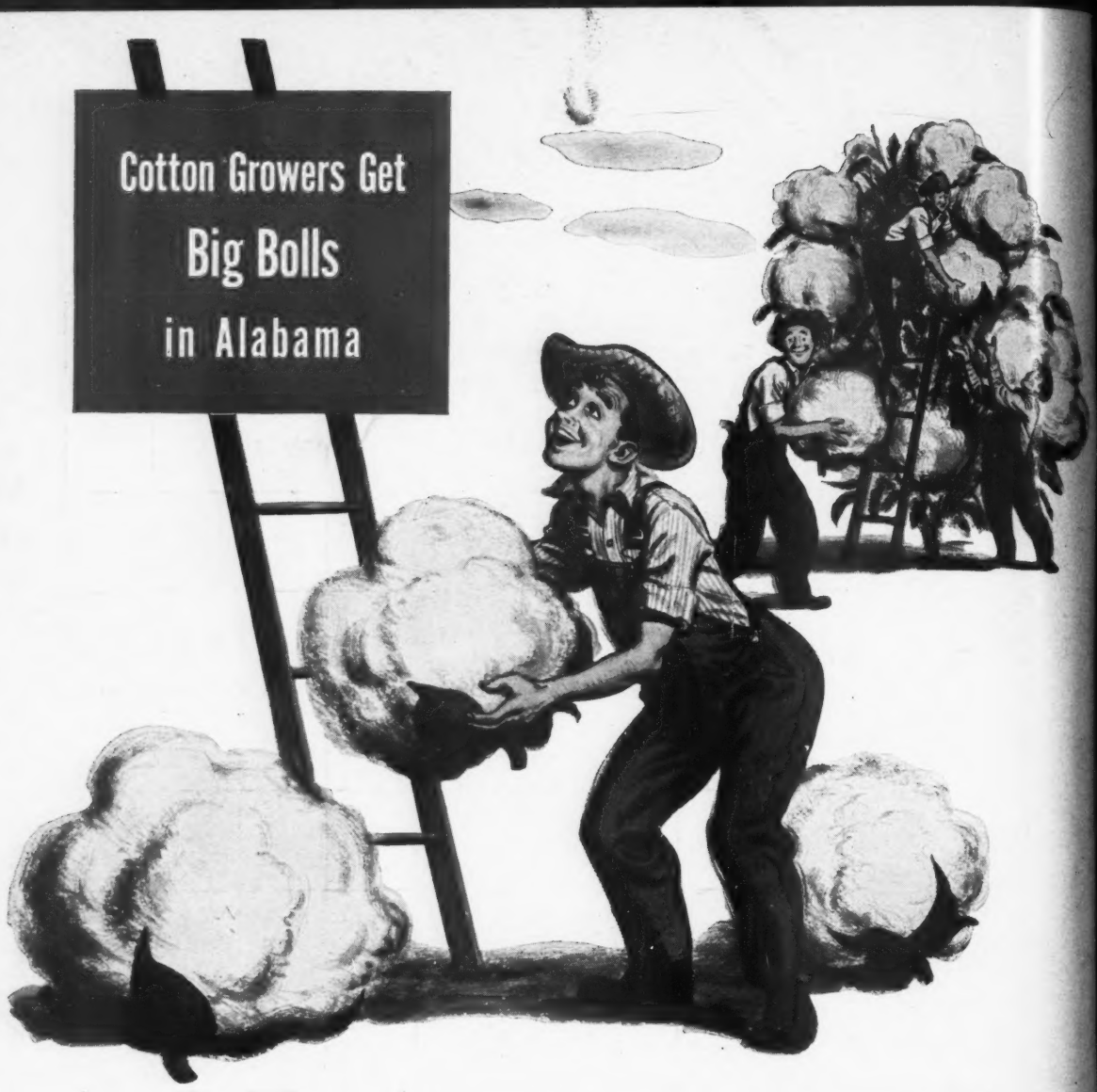

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